REMARKS

This amendment, submitted in response to the Office Action dated August 22, 2003, is believed to be fully responsive to each point of rejection raised therein. Accordingly, favorable reconsideration on the merits is respectfully requested.

The Examiner has objected to the drawings. The drawings have been corrected as indicated above. Reference numerals 33L and 33R have been added to Fig. 6. Also, reference numerals 32L and 32R have been added to the specification.

The Examiner has objected to the specification. The specification has been amended as indicated above. With respect to the Examiner's objection regarding page 12, line 1, Applicant submits that the terms "d^2x/dt^2", "ψ", "dx/dt", and "x" are defined, are physical laws, or would be known to one of ordinary skill in the art.[1] The variables "d^2x/dt^2" represent acceleration, variable "dx/dt" represents velocity, variable "x" represents a position, and variable "ψ" is defined by $c=c/2\sqrt{km}$ (See pg. 12, equation 2). With respect to the objection on page 15, line 12 and page 16, line 17, Applicant submits that the meaning of "the tires idle" in described on page 15, line 12. Page 15 of the specification states that the "tires idle or slip". With respect to page 20, line 6, Applicant submits that no correction is needed and that the Examiner's proposed amendment is redundant.

Claims 1-10 are all the claims pending in the application. Claims 8-10 have been withdrawn from consideration. The Examiner has objected to claims 4-6 for informalities. The

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[1] See attached excerpt defining acceleration and velocity.

claims have been amended as indicated above. With respect to claim 4, Applicant submits that

the claim is clear, but for purposes of expediting prosecution of this case, Applicant has amended

claim 4.

Claims 3 and 7 have been rejected under 35 U.S.C. §112, first paragraph as containing

subject matter not described in the specification. Claims 2 and 7 have been rejected under 35

U.S.C. §112, second paragraph as being indefinite. Claims 1-3, and 7 have been rejected under

35 U.S.C. §102(b) as being anticipated by Baun (DE 3610519). Claims 4-6 have been rejected

under 35 U.S.C. §103(a) as being unpatentable over Baun. Applicant submits the following in

traversal of the rejections.

Rejection of claims 3 and 7 under 35 U.S.C. §112, first paragraph

The Examiner maintains claims 3 and 7 contain subject matter not described in the

specification in such a way to convey to one skilled in the art that the Applicant has possession

of the claimed invention at the time the application was filed. In particular, the Examiner states,

that the specification fails to provide an adequate description for the "width direction" and the

"load support direction". Applicant submits that the meaning of "the width direction" is

described in page 22, second full paragraph to page 23, second paragraph, and Fig. 5. The

meaning of "load support direction" is described on page 27, first paragraph to page 29, second

paragraph.

Furthermore, the Examiner states that the embodiment in Fig. 7 describes an actuator for

applying vibration to the tire, but that no details are given concerning the construction of the

actuator or its connection with the tire. Applicant submits that the specification as written

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includes a sufficient description of an actuator. Further, the purpose and function of an actuator, and, specifically, how an actuator applies micro-vibration in at least a load support direction, is known to one of ordinary skill in the art and the Applicant need not limit the actuator to any particular embodiment.

For the above reasons, Applicant submits that the Section 112, first paragraph rejection to claims 3 and 7 should be withdrawn.

Rejection of claims 2 and 7 under 35 U.S.C. §112, second paragraph

Claims 2 and 7 have been rejected as being indefinite. Applicant notes that the elements of claim 2 have been added to claim 1 and claim 2 has consequently been canceled. Applicant has also amended the claim to cure the antecedent basis issue.

The Examiner states that it is unclear at to what constitutes a response frequency. Applicant submits that the response frequency of a vehicle would be clear to one of ordinary skill in the art.

For purposes of clarification, a response frequency is a dynamic response exhibited, for example, in yaw rate during running. See page 4, lines 5-9.

With respect to claim 7, the Examiner maintains "deformation of vibration" is confusing and inconsistent with claim 1. It is unclear how "deformation of the vibration" is confusing and inconsistent with claim 1, since the Examiner has not provided any explanation. According to claim 1, a vibration is applied to a tire. In claim 7, at least one of an amplitude, a frequency, and a phase of deformation of the vibration, is controlled to minimize a rolling resistance. See for

example, page 29, second full paragraph. This does not appear to be inaccurate, therefore,

Applicant respectfully requests that the Examiner clarify why the language of claim 7 is

inaccurate. Otherwise, the rejection of claims 2 and 7 should be withdrawn.

Rejection of claims 1-3, and 7 under 35 U.S.C. §102(b) as being anticipated by Baun

The Examiner maintains Baun (abstract and Figs. 3 and 4) teaches the elements of claims

1-3 and 7. Applicant notes that claim 1 has been amended to include the subject matter of claim

2 and claim 2 has consequently been canceled.

Baun pertains to a device for increasing the contact pressure between a wheel and the

road in order to obtain an improved grip. Medium-frequency or high-frequency vertical

oscillations are superimposed on the rotational motion of each rolling wheel. See abstract. Figs.

3 and 4.

Claim 1 describes a vibration applied to a tire having a higher frequency then the

response frequency of a vehicle, claim 3 describes the vibration is applied in at least one of a

revolution direction, width direction and load support direction of a tire, and claim 7 describes at

least one of an amplitude, a frequency, and a phase information of the vibration is applied to the

tire. It does not appear that Baun describes these claimed features and the Examiner has not

established otherwise. Furthermore, since the Examiner has not established that all of the

claimed elements of the present invention are taught in Baun, Baun does not anticipate claims 1,

3 and 7.

<u>Rejection of claims 4-6 under 35 U.S.C. §103(a) as being unpatentable over Baun</u>

The Examiner maintains Baun teaches the elements of claims 4-6 stating that it would have been obvious to one of ordinary skill in the art to select the frequency ranges identified in claims 4-6.

The Examiner has not established where Baun discloses any value of amplitude and frequency of a vibration, let alone a range of values for frequency and amplitude. Therefore, Applicant submits the ranges are not obvious and the Examiner's reasoning is merely a result of hindsight upon viewing the applicants invention.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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CUSTOMER NUMBER

Date: December 22, 2003

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$$\boxed{45° \text{ below the } +x \text{ direction}}$$

Acceleration: Since $\mathbf{a}(t) = d\mathbf{v}/dt$, by differentiating

$$\mathbf{a}(t) = \frac{d\mathbf{v}}{dt} = \frac{d}{dt}\,[32\hat{\mathbf{x}} + (64 - 32t)\hat{\mathbf{y}}]$$

we obtain

$$\mathbf{a}(t) = \boxed{-32.0\hat{\mathbf{y}}\,\frac{\text{ft}}{\text{s}^2}}$$

The acceleration is thus in the negative y direction and constant in value.

2.12 Kinematic Equations for Linear Motion with Constant Acceleration

Now that vector definitions for position, velocity, and acceleration have been expressed in general terms, let us turn to the special case of *motion along a straight line with constant acceleration.* In analyzing such motion, we will derive three **kinematic equations** that are extremely useful in solving problems. These equations do not contain any new information that is not inherently in the fundamental definitions of $\mathbf{r}$, $\mathbf{v}$, and $\mathbf{a}$. But they make explicit certain relationships between these concepts, and they provide the most useful starting point in the analysis of motion.

For motion along a straight line, we choose a rectangular coordinate system that is oriented so that one of the axes (for example, the x axis) is along the line. Then, components of position, velocity, and acceleration lie along this direction, and the y and z components are zero. The *vector* equations then become *scalar* equations, as illustrated here for the x direction:

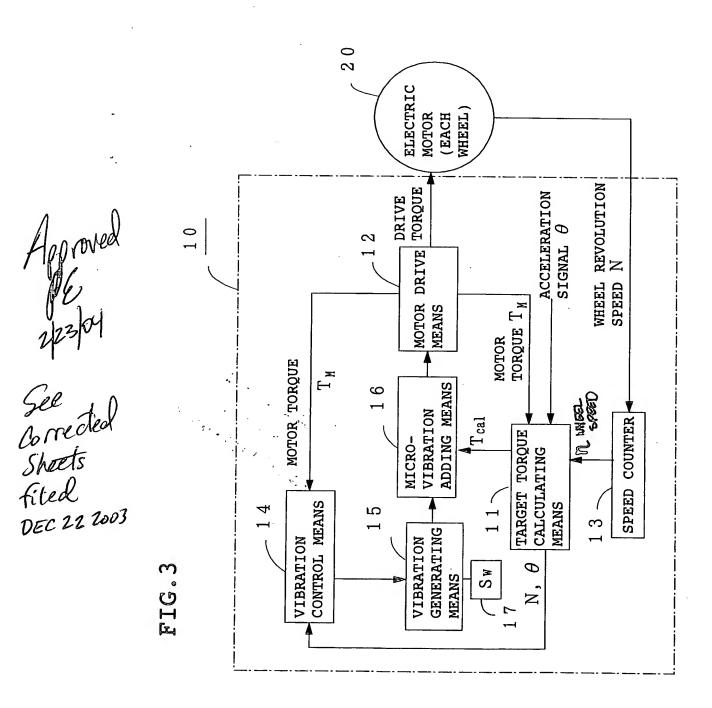| **Vectors**	**Scalars**	
$\mathbf{r} = r_x\hat{\mathbf{x}} + r_y\hat{\mathbf{y}} + r_z\hat{\mathbf{z}}$	$r = x$	(2–14)
$\mathbf{v} = \dfrac{dr_x}{dt}\hat{\mathbf{x}} + \dfrac{dr_y}{dt}\hat{\mathbf{y}} + \dfrac{dr_z}{dt}\hat{\mathbf{z}}$	$v = \dfrac{dx}{dt}$	(2–15)
$\mathbf{a} = \dfrac{dv_x}{dt}\hat{\mathbf{x}} + \dfrac{dv_y}{dt}\hat{\mathbf{y}} + \dfrac{dv_z}{dt}\hat{\mathbf{z}}$	$a = \dfrac{dv}{dt}$	(2–16)

By using these *scalar* symbols with appropriate plus and minus signs, we correctly express both the magnitude and direction of the vectors $\mathbf{r}$, $\mathbf{v}$, and $\mathbf{a}$. Scalar equations often are simpler to handle mathematically than vector equations, and they are useful for analyzing problems that involve curvilinear motion in two or three dimensions, since the component directions can be considered separately along the path and at right angles to the path.

Let us begin our discussion of the *straight-line* motion of a point moving with *constant* acceleration along the $+x$ axis. At $t = 0$, the point may have some

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FIG.3

Approved
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2/23/04

See
Corrected
Sheets
filed
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20 ELECTRIC MOTOR (EACH WHEEL)

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DRIVE TORQUE

12 MOTOR DRIVE MEANS

MOTOR TORQUE T$_M$

14 VIBRATION CONTROL MEANS

T$_M$

16 MICRO-VIBRATION ADDING MEANS

T$_{cal}$

ACCELERATION SIGNAL θ

WHEEL REVOLUTION SPEED N

15 VIBRATION GENERATING MEANS

11 TARGET TORQUE CALCULATING MEANS

n WHEEL SPEED

13 SPEED COUNTER

Sw

17

N, θ

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FIG.6